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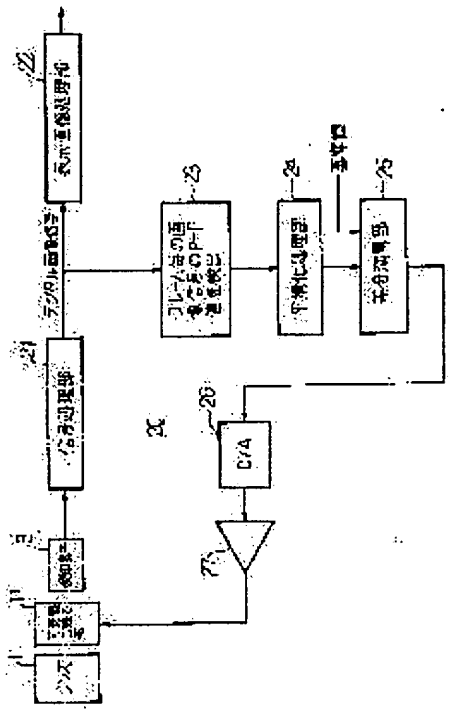
(54) INFRARED VIDEO APPARATUS

(57)Abstract:

PURPOSE: To contrive a longer life of a detector by a method wherein the level of input infrared rays to be detected with the detector to control a variable opening stop according to the level and a proper quantity of light received is applied to the detector to eliminate operating disturbance.

CONSTITUTION: A detector 3 converts infrared rays incident via a lens 1 and a variable opening stop part 11 into an analog signal to be applied to a signal processing section 21. The signal processing section 21 converts the signal into a digital image signal to be sent to a display/image processing section 22 and an infrared image of a target object is shown on a display device. The digital image signal is also sent to a detecting section 23, with which a p-p(peak-peak) value of the signal per frame of the digital image is detected. The p-p value is smoothed with a smoothing processing section 24 to output the maximum value of the image signal per frame and the maximum value is compared with a reference value by a difference computing section 25 to obtain a difference value. The difference value is converted into an analog signal with an A/D converter 26 to be amplified in power with a power amplifier 27 and the results are applied to the stop part 11 to control a specified opening area.



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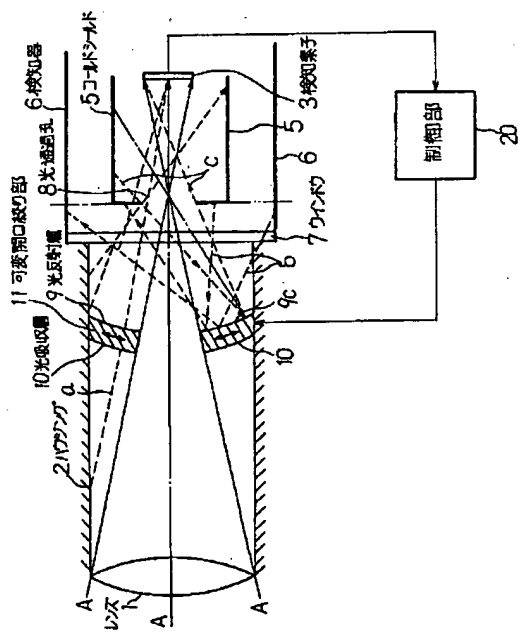
(54)【発明の名称】　赤外線映像装置

(57)【要約】

【目的】　赤外線映像装置の光学系に関し、赤外線光を受光する一端面にレンズを有するハウジングと、該ハウジングの他端面に接合されたウインドウを介して該赤外線光を内部に設けたコールドシールドの更に内部に設けた検知素子で受光する検知器とで構成された赤外線映像装置において、開口絞り部の絞りが入力赤外線光のレベルに応じて可変となる様にすることを目的としている。

【構成】　検知素子によって検知される入力赤外線レベルに応じて開口絞りの絞りを制御するように構成したので、赤外線光の入力レベルが過大になったときでも又は過少になったときでもそれぞれに対応した開口絞りによって適切な受光量が検知素子に与えられる事となり、赤外線映像装置の動作障害を無くすとともに検知素子の長寿命化を計ることができる。

本発明の原理図



1

【特許請求の範囲】

【請求項１】　赤外線光を受光する一端面にレンズ(1)を有するハウジング(2)と、該ハウジング(2)の他端面に接合されたウインドウ(7)を介して該赤外線光を内部に設けたコールドシールド(5)の更に内部に設けた検知素子(3)で受光する検知器(6)とで構成された赤外線映像装置において、

前記レンズ(1)と前記検知器(6)との間のハウジング内の所定位置に前記検知器(6)の側が凹面の光反射層(9)で形成され、前記レンズ(1)の側が光吸収層(10)で形成され、更に中心光軸上に前記レンズ(1)の収束赤外線光のみを通過させる可変開口絞り部(11)と、

前記検知素子(3)によって検知される入力赤外線レベルに応じて前記可変開口絞り部(11)の絞りを制御する制御部(20)と、

を備えたことを特徴とする赤外線映像装置。

【請求項２】　前記可変開口絞り部(11)が、複数枚の可動ブレードと、前記ハウジング(2)の外周上に設けられて該ハウジング(2)の中心光軸と平行に移動する回転リングを有するモータと、前記ハウジング(2)の外周上に設けられて該回転リングの回転移動により該中心光軸と平行に移動するスライダと、該スライダに取り付けられて前記可動ブレードを開閉させる押えピンとで構成したことを特徴とする請求項１に記載の赤外線映像装置。

【請求項３】　前記制御部(20)が、入力赤外線光をディジタル画像信号に変換してフレーム毎の該画像信号の最大レベルを検出し該平均レベルに応じて該モータを制御することを特徴とした請求項２に記載の赤外線映像装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は赤外線映像装置に関し、特に赤外線映像装置の光学系に関するものである。

【０００２】赤外線光を受光するレンズを収容したハウジングと、このハウジングに接続されて赤外線光を検知する検知器とで構成された赤外線映像装置においてはハウジングからハウジング温度に依存した赤外線が放射されるため、この放射赤外線が検知器に入射するとハウジング温度の変動によって検知器出力が変動する事となり、赤外線映像装置の映像品質が劣化する。そこで、ハウジングからの放射赤外線が検知器に入射する事を防止できる光学系が必要になっている。

【０００３】

【従来の技術】図８は上記のようにハウジングと検知器とで構成された本出願人による特開平１－１５５２２０号公報に開示された従来の赤外線映像装置を示したものであり、レンズ１などの光学エレメントがハウジング２の一方の端面に固定されており、このハウジング２の他方の端面には検知器６が取り付けられている。

【０００４】検知器６の入力側にはウインドウ７が設けられており、更に検知器６の内部にはコールドシールド５が設けられ、更にそのコールドシールド５の内部に検知素子３が設けられている。

2

【０００５】このような状態において、目標物体からの赤外線光ａ（実線で示す）はレンズ１で収束されウインドウ７を通って検知器６内に入り、更にコールドシールド５の光通過孔８を通って光検知素子３に入射して検知されるようになっている。

【０００６】このような構成だけでは、ハウジング２の内壁からハウジング温度に依存した赤外線ａが放射され、この放射赤外線ａが検知素子３に入射するとハウジング温度の変動によって検知素子３の出力が変動してしまい赤外線映像装置の映像品質が劣化してしまう。

【０００７】そこで、このようなハウジング２からの赤外線ａを遮断するためハウジング２の所定位置にウインドウ７の側が凹面の光反射層９で形成されレンズ１の側が光吸収層１０で形成され、且つ中心光軸上にレンズ１の収束赤外線光のみを通過させる開口絞り部１１を設けている。

【０００８】このようにすることにより、レンズ１と開口絞り部１１との間のハウジング２の内面から放射された赤外線光ａの大部分は開口絞り部１１の光吸収層１０で吸収され、また開口絞り部１１とコールドシールド５との間に存在する部品から放射される赤外線光ｂはすべて開口絞り部１１の凹面に形成された光反射層９によって検知素子３に入射しない角度で反射され、コールドシールド５の中への入射を防いでいる。

【０００９】また、光反射層９とウインドウ７との間のハウジング内面から放射される赤外線光ｃはコールドシールド５の光通過孔８の遮断効果によって検知素子３に入射されないようになっいる。

【００１０】

【発明が解決しようとする課題】このように特開平１－１５５２２０号公報に示された赤外線映像装置では、ハウジング内面からの放射赤外線の検知素子３への入射量を低減させているが、開口絞り部１１の絞りが一定であるため、例えば強い赤外線光が入力されたときには検知素子３の受光量が過大になってしまい、赤外線映像装置として正常な動作が出来なくなってしまうと言う問題があった。

【００１１】従って本発明は、赤外線光を受光する一端面にレンズを有するハウジングと、該ハウジングの他端面に接合されたウインドウを介して該赤外線光を内部に設けたコールドシールドの更に内部に設けた検知素子で受光する検知器とで構成された赤外線映像装置において、開口絞り部の絞りが入力赤外線光のレベルに応じて可変となる様にすることを目的としている。

【００１２】

【課題を解決するための手段】上記の目的を達成するため、本発明に係る赤外線映像装置は、図１に概略的に示

すように、レンズ1と検知器6との間のハウジング内の所定位置に検知器6の側が凹面の光反射層9で形成され、レンズ1の側が光吸収層10で形成され、更に中心光軸上に前記レンズ1の収束赤外線光のみを通過させる可変開口絞り部11と、検知素子3によって検知される入力赤外線レベルに応じて可変開口絞り部11の絞りを制御する制御部20と、を備えている。

【0013】そして、上記の可変開口絞り部11は、複数枚の可動ブレードと、ハウジング2の外周上に設けられてハウジング2の中心光軸と平行に移動する回転リングを有するモータと、ハウジング2の外周上に設けられて該回転リングの回転移動により該中心光軸と平行に移動するスライダと、該スライダに取り付けられて前記の可動ブレードを開閉させる押えピンとで構成することができる。

【0014】更に制御部20は、入力赤外線光をディジタル画像信号に変換してフレーム毎の該画像信号の最大レベルを検出し該平均レベルに応じて前記モータを制御することができる。

【0015】

【作用】本発明に係る赤外線映像装置の動作においては、図1に示すように検知素子3で検知される入力赤外線光のレベルを制御部20が検知し、この制御部20がそのレベルに応じて可変開口絞り部11の絞りを制御している。

【0016】これにより、赤外線光の入力レベルが高いときには可変開口絞り部11の開口を小さくするとともに、赤外線光の入力レベルが低いときには可変開口絞り部11を緩めるようにして常に検知素子3の受光量を適切な値に保つようにし、赤外線映像装置の動作を正常に保っている。

【0017】

【実施例】図2は図1に示した可変開口絞り部11の概略的な構造を示したもので、先ずハウジング2にはその外周にリング状のモーター12が設けられており、このモーター12とハウジング2との間にはモーター12により動かされるスライダ123が設けられている。

【0018】また、ハウジング2には長穴13が溝として設けられており、この長穴13には押えピン124がスライダ123に取り付けられてスライダ123と共にこの長穴13の中を移動可能になっている。そして、この押えピン124にはバネ125が図示の様に内蔵されており常にハウジング2の中心軸に向かって移動しようとしているが、この押えピン124の先端がブレード126と接触するため、この接触点において押えピン124が停止するようになっている。言い換えると、この押えピン124によって決められた位置までブレード126がそのブレード軸127を中心として回転し停止するようになっている。

【0019】スライダ123はモーター12に所定の信号が与えられることによりハウジング2の軸を中心にして回転しながらバネ129に抗して図示の上方に移動するようになっており、上押さえ130で上限が設定されている。また、スライダ123の下方移動はモーター12が逆回転することによりバネ129の反発力により行われる。尚、14はモータ12を固定するための固定部である。

【0020】そして、これに伴い、スライダ123が押えピン124を動かし所定位置でブレード126を停止させることにより、図示のような開口128が形成されてこの開口128から赤外線光が受け入れられるようになっている。

【0021】尚、図示の状態では押えピン124が2本だけ示されているが、これは図の紙面に垂直な方向にも2本さらに設けらており、同様にしてブレード軸127も合わせて4本設けられている。

【0022】図3は図2のような構造においてブレード126が駆動されて得られる開口128が最も小さい場合を示しており、この実施例では4枚のブレード126a～126dが設けられており、ブレード126aと126bが図の上下方向に動き、ブレード126cと126dが図の左右方向に移動することにより開口128が形成されるようになっている。尚、同図（b）及び（c）は同図（a）の状態をそれぞれ左右及び上下から見たときの図を示している。

【0023】図4は同様にしてブレード126a～126dを駆動したときに形成される最大の開口128を示している。

【0024】図5は図2に示した可変開口絞り部11の斜視図を示しており、この実施例では、モーター12を、ハウジング2の最も外側に設けた固定子としての外筒120と、外筒120の内側に設けた回転子121と、この回転子121の内側に設けられてキー1210により回転子121と共に回転する回転リング122とで構成している。

【0025】また、回転リング122とスライダ123とはネジの山123aと谷123bとによりネジ係合されており、従って、回転子121が回転するときには回転リング122も回転し、これによりスライダ123が回転しながら上下に移動するようになっている。

【0026】更に、この図からも分かるようにハウジング2には長穴（溝）13が切られており、この長穴13に沿ってスライダ123に設けた押えピン124が動くようになっている。このスライダ123は上述したように例えば図の上方に並進するときには回転リング122により移動させられるが、回転リング122が図示とは逆の方向に回転するときにはバネ129によって下方に押し下げられて行くようになっている。

【0027】そして回転リング122によりスライダ123が押えピン124を移動させるとき、最大位置以上

5

は移動させないようにするため上押え１３０が設けられている。

【００２８】図6は、図5に於いて線Ｘ－Ｘによって切断したときの可変開口絞り部１１の平面断面図を示しており、この図から判るように、押えピン１２４はスライダ１２３が長穴１３に嵌め込まれるようになっており、この嵌め込んだ状態から押えピン１２４がブレード１２６を押すようにするためバネ１３１が内部に設けられている。

【００２９】このようにしてスライダ１２３が長穴１３をスライドするに伴って押えピン１２４がブレード１２６を開いたり閉じたりして開口１２８の面積を制御している。

【００３０】図7は上記に示した可変開口絞り部１１を制御するための制御部２０の実施例を示したもので点線で示したレンズ1と、可変開口絞り部１１と、検知素子３とは上記に示したものと同じものである。

【００３１】そして検知素子３ではレンズ1及び可変開口絞り部１１を経て入射された赤外光をアナログ信号に変換して信号処理部２１に与えると、この信号処理部２１では入力アナログ信号をディジタル画像信号に変換して表示・画像処理部２２へ送ることにより表示器（図示せず）で目標物体の赤外線画像を表示するようにしている。

【００３２】また、信号処理部２１のディジタル画像信号は検出部２３にも送られ、ここでディジタル画像のフレーム毎の信号におけるｐ－ｐ（ピーク－ピーク）の値を検出する。検出部２３で検出されたｐ－ｐ値は平滑化処理部２４で平滑化されてフレーム毎の画像信号の最大値を出力し、この最大値と基準値とを差分演算部２５に於いて比較することにより両者の差分値が得られる。

【００３３】差分演算部２５で得られる差分値はＤ／Ａ変換器２６でアナログ信号に変換されたうえ、パワーアンプ２７で電力増幅されることにより可変開口絞り部１１に与えられることとなる。

【００３４】従って、現在の検知された赤外線光のレベルはその最大値が基準値とどの程度異なっているかによって可変開口絞り部１１のモーター１２１の回転リング１２２の移動量が決定され、これに伴ってスライダ１２３を介し押えピン１２４がブレード１２６を所定の開口面積にするように制御している。

【００３５】

【発明の効果】以上のように本発明に係る赤外線映像装置によれば、検知素子によって検知される入力赤外線レベルに応じて開口絞りの絞りを制御するように構成したので、赤外線光の入力レベルが過大になったときでも又は過少になったときでもそれぞれに対応した開口絞りによって適切な受光量が検知素子に与えられる事となり、赤外線映像装置の動作障害を無くすとともに検知素子の長寿命化を計ることができる。

6

【図面の簡単な説明】

【図１】本発明に係る赤外線映像装置の概略構成図である。

【図２】本発明に係る赤外線映像装置に用いる可変開口絞り部の概略構成図である。

【図３】本発明に用いるブレードの制御状態により最小の開口が得られた状態を示す図である。

【図４】本発明に用いるブレードの制御状態により最大の開口が得られた状態を示す図である。

【図５】本発明に用いる可変開口絞り部の実施例を示す斜視図である。

【図６】図５に於いて線Ｘ－Ｘにより切断した可変開口絞り部の平面断面図である。

【図７】本発明に係る赤外線映像装置に用いられる制御部の実施例の構成を示したブロック図である。

【図８】従来技術（特開平１－１５５２２０号公報）を示した図である。

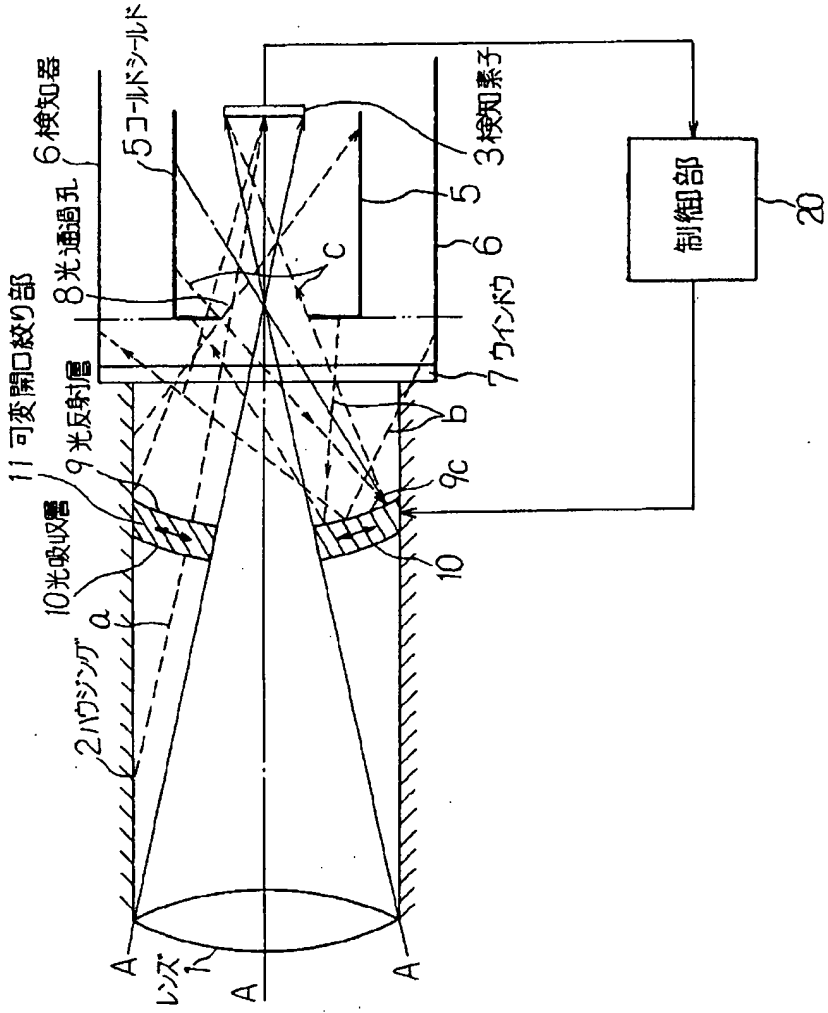
【符号の説明】

１　レンズ
２　ハウジング
３　検知素子
５　コールドシールド
６　検知器
７　ウインドウ
９　光反射層
１０　光吸収層
１１　可変開口絞り部
１２　モーター
１３　長穴
２０　制御部
１２３　スライダ
１２４　押えピン
１２５　バネ
１２６　ブレード
１２８　開口

図中、同一符号は同一又は相当部分を示す

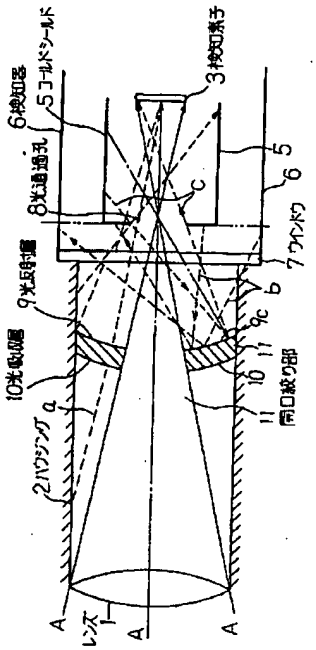
【図1】

本発明の原理図



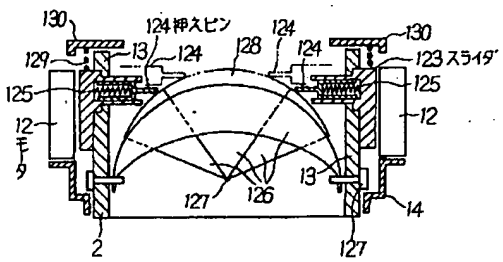
【図8】

従来例

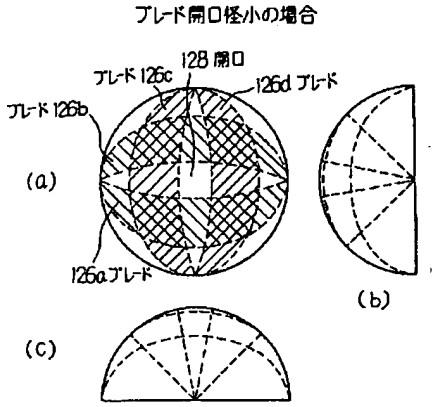


【図2】

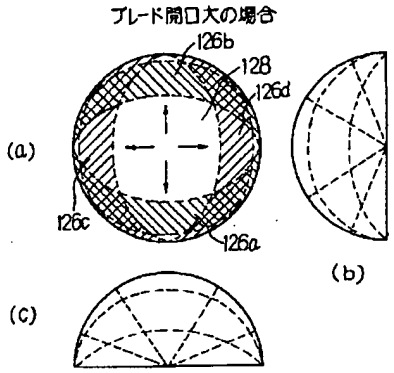
可変開口絞り部の概略構造図



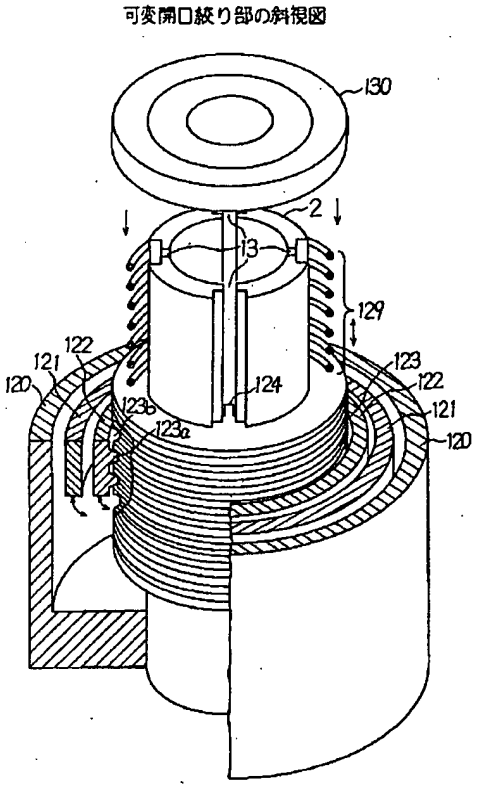
【図3】


ブレード開口径小の場合
ブレード 126c
128 開口
126d ブレード
ブレード 126b
(a)
126a ブレード
(b)
(c)

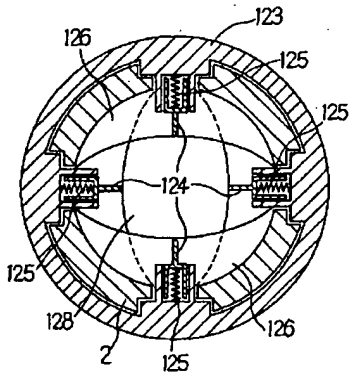
【図4】


ブレード開口大の場合
126b
128
126d
(a)
126c
126a
(b)
(c)

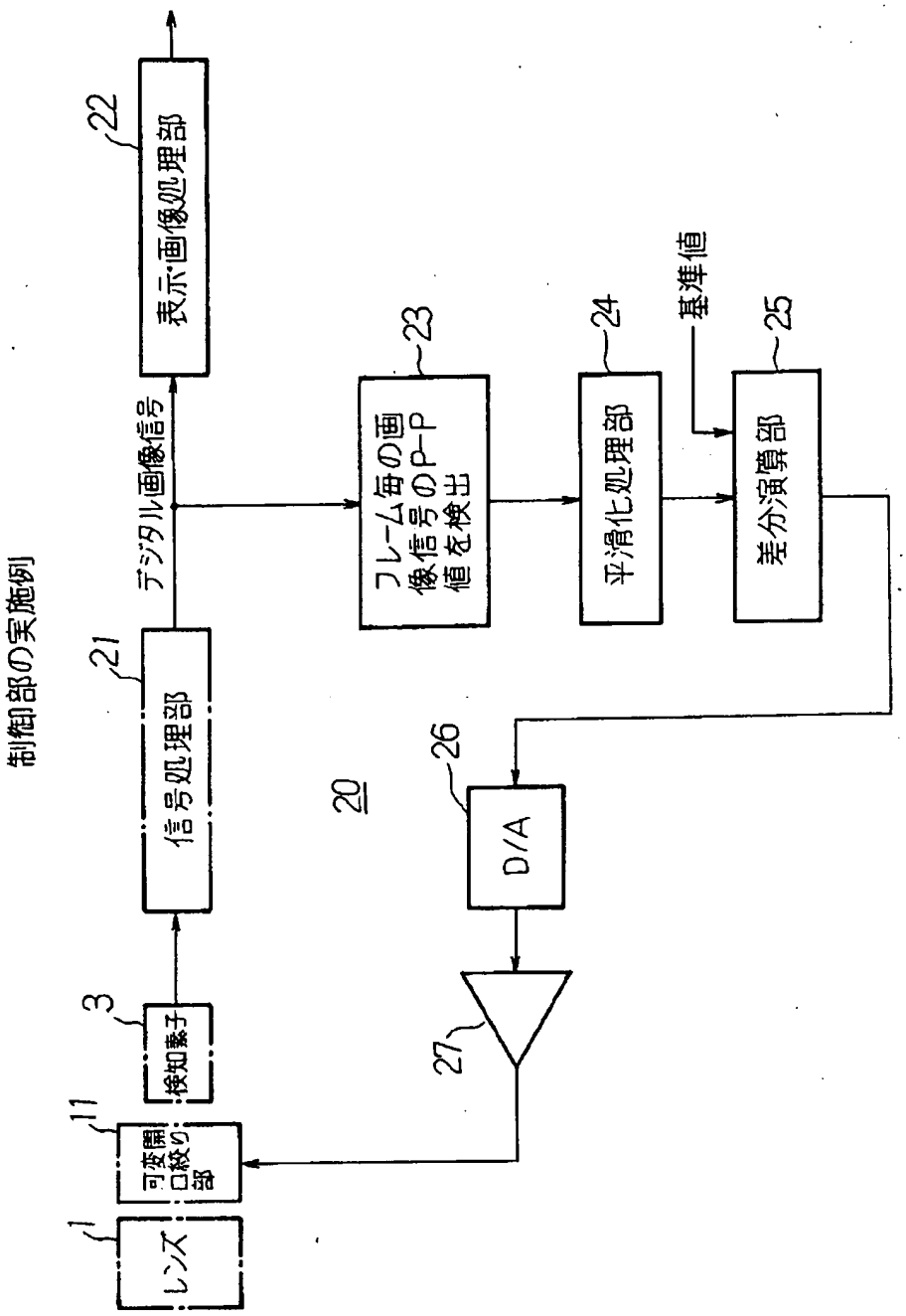
【図5】


可変開口絞り部の斜視図
130
2
13
129
122
121
120
124
123
122
121
120
123b
123a

【図6】


可変開口絞り部の平面断面図
123
126
125
125
124
125
128
2
125
126

【図7】


制御部の実施例
1
レンズ
11
可変開口絞り部
3
検知素子
21
信号処理部
20
22
表示画像処理部
デジタル画像信号
23
フレーム毎の画像信号のP-P値を検出
24
平滑化処理部
基準値
25
差分演算部
26
D/A
27

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the optical system of infrared image equipment about infrared image equipment.

[0002] Since the infrared radiation for which it depended on housing temperature from housing in the infrared image equipment which consisted of housing which held the lens which receives infrared light, and a detector which is connected to this housing and detects infrared light is emitted, if this radiation infrared radiation carries out incidence to a detector, a detector output will be changed and the image quality of infrared image equipment will deteriorate by fluctuation of housing temperature. Then, the optical system to which the radiation infrared radiation from housing can prevent carrying out incidence to a detector is needed.

[0003]

[Description of the Prior Art] Drawing 8 shows the conventional infrared image equipment indicated by JP,1-155220,A by these people who consisted of housing and a detector as mentioned above, optical elements, such as a lens 1, are being fixed to one end face of housing 2, and the detector 6 is attached in the other-end side of this housing 2.

[0004] The window 7 is established in the input side of a detector 6, the cold shielding 5 is further formed in the interior of a detector 6, and the detector element 3 is further formed in the interior of the cold shielding 5.

[0005] In such a condition, it converges with a lens 1, and the infrared light a from a target body (a continuous line shows) enters in a detector 6 through a window 7, carries out incidence to the optical detector element 3 through the optical passage hole 8 of the cold shielding 5 further, and is detected.

[0006] Only with such a configuration, if the infrared radiation a for which it depended on housing temperature from the wall of housing 2 is emitted and this radiation infrared radiation a carries out incidence to a detector element 3, by fluctuation of housing temperature, the output of a detector element 3 will be changed and the image quality of infrared image equipment will deteriorate.

[0007] Then, the aperture-diaphragm section 11 which a window 7 side is formed [section] in the predetermined location of housing 2 in the concave light reflex layer 9, and a lens 1 side is formed [section] in the light absorption layer 10 in order to intercept the infrared radiation a from such housing 2, and passes only the convergence infrared light of a lens 1 on a main optical axis is formed.

[0008] The great portion of infrared light a emitted by doing in this way from the inside of the housing 2 between a lens 1 and the aperture diaphragm section 11 is absorbed in the light absorption layer 10 of the aperture diaphragm section 11. Moreover, it was reflected at the include angle which does not carry out incidence to a detector element 3 by the light reflex layer 9 altogether formed in the concave surface of the aperture-diaphragm section 11, and the infrared light b emitted from the components which exist between the aperture-diaphragm section 11 and the cold shielding 5 has prevented the incidence to the inside of the cold shielding 5 by it.
[0009] Moreover, the infrared light c emitted from the housing inside between the light reflex layer 9 and a window 7 is ******** so that incidence may not be carried out to a detector element 3 by the screening effect of the optical passage hole 8 of the cold shielding 5.
[0010]
[Problem(s) to be Solved by the Invention] Thus, with the infrared image equipment shown in JP,1-155220,A, although the amount of incidence to the detector element 3 of the radiation infrared radiation from a housing inside was reduced, since the diaphragm of the aperture-diaphragm section 11 was fixed, when a strong infrared light was inputted, the light income of a detector element 3 became excessive, and there was a problem said that actuation normal as infrared image equipment will become impossible.
[0011] Therefore, this invention aims at make it a diaphragm of the aperture diaphragm section serve as adjustable according to the level of input infrared light in the infrared image equipment which consisted of detectors which receive light by the detector element of housing which has a lens in the end side which receives infrared light, and cold shielding which prepared this infrared light in the interior through the window joined by the other end side of this housing further prepared in the interior.
[0012]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the infrared image equipment concerning this invention As roughly shown in drawing 1 , a detector 6 side is formed in the predetermined location in housing between a lens 1 and a detector 6 in the concave light reflex layer 9. The lens 1 side was formed in the light absorption layer 10, and is equipped with the adjustable aperture diaphragm section 11 which passes only the convergence infrared light of said lens 1 on a main optical axis further, and the control section 20 which controls a diaphragm of the adjustable aperture diaphragm section 11 according to the input infrared level detected by the detector element 3.
[0013] And the above-mentioned adjustable aperture diaphragm section 11 is formed on the movable blade and the periphery of housing 2 of two or more sheets, and can consist of the main optical axis of housing 2, a motor which has the rotation ring which moves to parallel, a slider which are formed on the periphery of housing 2 and move to this main optical axis and parallel by rotation of this rotation ring, and a presser-foot pin which it is attached [pin] in this slider and make the aforementioned movable blade open and close.
[0014] Furthermore, a control section 20 can change input infrared light into a digital image signal, can detect the maximum level of this picture signal for every frame, and can control said motor according to this average level.
[0015]
[Function] In actuation of the infrared image equipment concerning this invention, as

shown in drawing 1 , a control section 20 detects the level of the input infrared light detected by the detector element 3, and this control section 20 is controlling the diaphragm of the adjustable aperture-diaphragm section 11 according to that level.
[0016] When the input level of infrared light is high, while making small opening of the adjustable aperture diaphragm section 11 by this, when the input level of infrared light is low, as the adjustable aperture diaphragm section 11 is loosened, the light income of a detector element 3 is always maintained at a suitable value, and actuation of infrared image equipment is kept normal.
[0017]
[Example] Drawing 2 is what showed the rough structure of the adjustable aperture diaphragm section 11 shown in drawing 1 , the ring-like motor 12 is first formed in housing 2 at that periphery, and the slider 123 moved by the motor 12 is formed between this motor 12 and housing 2.
[0018] Moreover, it is prepared in housing 2 as slot 13 fang furrow, and it presses down to this slot 13, and a pin 124 is attached in a slider 123 and is movable about the inside of this slot 13 with the slider 123. And although the spring 125 is built in this presser-foot pin 124 like illustration and always being moved and had to it toward the medial axis of housing 2, in order that the tip of this presser-foot pin 124 may contact a blade 126, it presses down in this point of contact, and a pin 124 stops. In other words, to the location decided by this presser-foot pin 124, a blade 126 rotates that blade shaft 127 as a core, and stops.
[0019] Rotating a slider 123 centering on the shaft of housing 2 by giving a predetermined signal to a motor 12, a spring 129 is resisted, it moves above illustration, and the upper limit is set up by the upper presser foot 130. Moreover, lower part migration of a slider 123 is performed by the repulsive force of a spring 129 when a motor 12 carries out inverse rotation. In addition, 14 is a fixed part for fixing a motor 12.
[0020] And by a slider's 123 pressing down, moving a pin 124 in connection with this, and stopping a blade 126 in a predetermined location, opening 128 like illustration is formed and infrared light is accepted from this opening 128.
[0021] In addition, although it presses down in the state of illustration and only two pins 124 are shown, two of these are further prepared also in the direction perpendicular to the space of drawing, it is made a **** cage and this appearance and four blade shafts 127 in all are also established.
[0022] The case where the opening 128 which a blade 126 drives drawing 3 in structure like drawing 2 , and is obtained is the smallest is shown, the blades 126a-126d of four sheets are formed in this example, Blades 126a and 126b move in the vertical direction of drawing, and opening 128 is formed when Blades 126c and 126d move to the longitudinal direction of drawing. In addition, this drawing (b) and (c) show drawing when seeing the condition of this drawing (a) from right and left and the upper and lower sides, respectively.
[0023] Drawing 4 shows the greatest opening 128 formed when Blades 126a-126d are driven similarly.
[0024] Drawing 5 shows the perspective view of the adjustable aperture diaphragm section 11 shown in drawing 2 , and constitutes it from an outer case 120 as a stator which formed the motor 12 in the outermost part of housing 2, a rotator 121 prepared inside the outer case 120, and a rotation ring 122 which is prepared inside this rotator 121

and rotates with a rotator 121 by the key 1210 in this example.
[0025] Moreover, the rotation ring 122 and a slider 123 move up and down, while the rotation ring 122 also rotates and a slider 123 rotates by this, when screw engagement is carried out by crest 123a and trough 123b of a screw, therefore a rotator 121 rotates.
[0026] Furthermore, as shown also in this drawing, the slot (slot) 13 is cut by housing 2, and the presser-foot pin 124 prepared in the slider 123 along with this slot 13 moves. When this slider 123 advances side by side above the drawing as mentioned above for example, it is moved with the rotation ring 122, but when the rotation ring 122 rotates in the direction contrary to illustration, with a spring 129, is depressed caudad and goes.
[0027] And when a slider 123 presses down with the rotation ring 122 and a pin 124 is moved, in order to make it not move more than the maximum location, the top presser foot 130 is formed.
[0028] Drawing 6 shows the flat-surface sectional view of the adjustable aperture-diaphragm section 11 when line X-X cuts in drawing 5 , and as shown in this drawing, in order that a slider 123 may be inserted in a slot 13, the presser-foot pin 124 may be pressed down from this condition of having inserted in and a pin 124 may push a blade 126, the spring 131 is formed in the interior.
[0029] Thus, it follows on a slider 123 sliding a slot 13, and presses down, and a pin 124 opens a blade 126, or closes, and is controlling the area of opening 128.
[0030] Drawing 7 is the same as the lens 1 which is what showed the example of the control section 20 for controlling the adjustable aperture-diaphragm section 11 shown above, and was shown by the dotted line, the adjustable aperture-diaphragm section 11, and the thing indicated to be a detector element 3 above.
[0031] And if the infrared light by which incidence was carried out through a lens 1 and the adjustable aperture-diaphragm section 11 in the detector element 3 is changed into an analog signal and it gives the signal-processing section 21, he is trying to display the infrared image of a target body with a drop (not shown) in this signal-processing section 21 by changing an input analog signal into a digital image signal, and sending to a display and the image-processing section 22.
[0032] Moreover, the digital image signal of the signal-processing section 21 is sent also to a detecting element 23, and detects the value of p-p (peak-peak) in the signal for every frame of a digital image here. the peak-to-peak value detected by the detecting element 23 is graduated in the data-smoothing section 24 -- having -- the maximum of the picture signal for every frame -- outputting -- this maximum and reference value -- difference -- comparing in operation part 25 -- both difference -- a value is acquired.
[0033] difference -- the difference obtained by operation part 25 -- a value will be given to the adjustable aperture-diaphragm section 11 by carrying out power amplification with power amplification 27, after being changed into an analog signal with D/A converter 26.
[0034] Therefore, the movement magnitude of the rotation ring 122 of the motor 121 of the adjustable aperture-diaphragm section 11 is determined by how many [a reference value and] the maximums differ, and the level of the infrared light as which current was detected is controlled so that the presser-foot pin 124 makes a blade 126 a predetermined opening area through a slider 123 in connection with this.
[0035]
[Effect of the Invention] Since according to the infrared image equipment applied to this invention as mentioned above it constituted so that a diaphragm of an aperture diaphragm

might be controlled according to the input infrared level detected by the detector element, even when the input level of infrared light becomes excessive, or even when it becomes [too little], while suitable light income will be given to a detector element by the aperture diaphragm corresponding to each and abolishing the failure of infrared image equipment of operation by it, the reinforcement of a detector element can be measured.

TECHNICAL FIELD

[Industrial Application] Especially this invention relates to the optical system of infrared image equipment about infrared image equipment.

[0002] Since the infrared radiation for which it depended on housing temperature from housing in the infrared image equipment which consisted of housing which held the lens which receives infrared light, and a detector which is connected to this housing and detects infrared light is emitted, if this radiation infrared radiation carries out incidence to a detector, a detector output will be changed and the image quality of infrared image equipment will deteriorate by fluctuation of housing temperature. Then, the optical system to which the radiation infrared radiation from housing can prevent carrying out incidence to a detector is needed.

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PRIOR ART

[Description of the Prior Art] Drawing 8 shows the conventional infrared image equipment indicated by JP,1-155220,A by these people who consisted of housing and a detector as mentioned above, optical elements, such as a lens 1, are being fixed to one

end face of housing 2, and the detector 6 is attached in the other-end side of this housing 2.

[0004] The window 7 is established in the input side of a detector 6, the cold shielding 5 is further formed in the interior of a detector 6, and the detector element 3 is further formed in the interior of the cold shielding 5.

[0005] In such a condition, it converges with a lens 1, and the infrared light a from a target body (a continuous line shows) enters in a detector 6 through a window 7, carries out incidence to the optical detector element 3 through the optical passage hole 8 of the cold shielding 5 further, and is detected.

[0006] Only with such a configuration, if the infrared radiation a for which it depended on housing temperature from the wall of housing 2 is emitted and this radiation infrared radiation a carries out incidence to a detector element 3, by fluctuation of housing temperature, the output of a detector element 3 will be changed and the image quality of infrared image equipment will deteriorate.

[0007] Then, the aperture-diaphragm section 11 which a window 7 side is formed [section] in the predetermined location of housing 2 in the concave light reflex layer 9, and a lens 1 side is formed [section] in the light absorption layer 10 in order to intercept the infrared radiation a from such housing 2, and passes only the convergence infrared light of a lens 1 on a main optical axis is formed.

[0008] The great portion of infrared light a emitted by doing in this way from the inside of the housing 2 between a lens 1 and the aperture diaphragm section 11 is absorbed in the light absorption layer 10 of the aperture diaphragm section 11. Moreover, it was reflected at the include angle which does not carry out incidence to a detector element 3 by the light reflex layer 9 altogether formed in the concave surface of the aperture-diaphragm section 11, and the infrared light b emitted from the components which exist between the aperture-diaphragm section 11 and the cold shielding 5 has prevented the incidence to the inside of the cold shielding 5 by it.

[0009] Moreover, the infrared light c emitted from the housing inside between the light reflex layer 9 and a window 7 is ******** so that incidence may not be carried out to a detector element 3 by the screening effect of the optical passage hole 8 of the cold shielding 5.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] Since according to the infrared image equipment applied to this invention as mentioned above it constituted so that a diaphragm of an aperture diaphragm might be controlled according to the input infrared level detected by the detector element, even when the input level of infrared light becomes excessive, or even when it becomes [too little], while suitable light income will be given to a detector element by the aperture diaphragm corresponding to each and abolishing the failure of infrared image equipment of operation by it, the reinforcement of a detector element can be measured.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Thus, with the infrared image equipment shown in JP,1-155220,A, although the amount of incidence to the detector element 3 of the radiation infrared radiation from a housing inside was reduced, since the diaphragm of the aperture-diaphragm section 11 was fixed, when a strong infrared light was inputted, the light income of a detector element 3 became excessive, and there was a problem said that actuation normal as infrared image equipment will become impossible. [0011] Therefore, this invention aims at make it a diaphragm of the aperture diaphragm section serve as adjustable according to the level of input infrared light in the infrared image equipment which consisted of detectors which receive light by the detector element of housing which has a lens in the end side which receives infrared light, and cold shielding which prepared this infrared light in the interior through the window joined by the other end side of this housing further prepared in the interior.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the infrared image equipment concerning this invention As roughly shown in drawing 1 , a detector 6 side is formed in the predetermined location in housing between a lens 1 and a detector 6 in the concave light reflex layer 9. The lens 1 side was formed in the light absorption layer 10, and is equipped with the adjustable aperture diaphragm section 11 which passes only the convergence infrared light of said lens 1 on a main optical axis further, and the control section 20 which controls a diaphragm of the adjustable aperture diaphragm section 11 according to the input infrared level detected by the detector element 3.

[0013] And the above-mentioned adjustable aperture diaphragm section 11 is formed on the movable blade and the periphery of housing 2 of two or more sheets, and can consist of the main optical axis of housing 2, a motor which has the rotation ring which moves to parallel, a slider which are formed on the periphery of housing 2 and move to this main optical axis and parallel by rotation of this rotation ring, and a presser-foot pin which it is attached [pin] in this slider and make the aforementioned movable blade open and close.

[0014] Furthermore, a control section 20 can change input infrared light into a digital image signal, can detect the maximum level of this picture signal for every frame, and can control said motor according to this average level.

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OPERATION

[Function] In actuation of the infrared image equipment concerning this invention, as shown in drawing 1 , a control section 20 detects the level of the input infrared light detected by the detector element 3, and this control section 20 is controlling the diaphragm of the adjustable aperture-diaphragm section 11 according to that level.

[0016] When the input level of infrared light is high, while making small opening of the adjustable aperture diaphragm section 11 by this, when the input level of infrared light is low, as the adjustable aperture diaphragm section 11 is loosened, the light income of a detector element 3 is always maintained at a suitable value, and actuation of infrared image equipment is kept normal.

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EXAMPLE

[Example] Drawing 2 is what showed the rough structure of the adjustable aperture diaphragm section 11 shown in drawing 1 , the ring-like motor 12 is first formed in housing 2 at that periphery, and the slider 123 moved by the motor 12 is formed between this motor 12 and housing 2.
[0018] Moreover, it is prepared in housing 2 as slot 13 fang furrow, and it presses down to this slot 13, and a pin 124 is attached in a slider 123 and is movable about the inside of this slot 13 with the slider 123. And although the spring 125 is built in this presser-foot pin 124 like illustration and always being moved and had to it toward the medial axis of housing 2, in order that the tip of this presser-foot pin 124 may contact a blade 126, it presses down in this point of contact, and a pin 124 stops. In other words, to the location decided by this presser-foot pin 124, a blade 126 rotates that blade shaft 127 as a core, and stops.
[0019] Rotating a slider 123 centering on the shaft of housing 2 by giving a predetermined signal to a motor 12, a spring 129 is resisted, it moves above illustration, and the upper limit is set up by the upper presser foot 130. Moreover, lower part migration of a slider 123 is performed by the repulsive force of a spring 129 when a motor 12 carries out inverse rotation. In addition, 14 is a fixed part for fixing a motor 12.
[0020] And by a slider's 123 pressing down, moving a pin 124 in connection with this, and stopping a blade 126 in a predetermined location, opening 128 like illustration is formed and infrared light is accepted from this opening 128.
[0021] In addition, although it presses down in the state of illustration and only two pins 124 are shown, two of these are further prepared also in the direction perpendicular to the space of drawing, it is made a **** cage and this appearance and four blade shafts 127 in all are also established.
[0022] The case where the opening 128 which a blade 126 drives drawing 3 in structure like drawing 2 , and is obtained is the smallest is shown, the blades 126a-126d of four sheets are formed in this example, Blades 126a and 126b move in the vertical direction of drawing, and opening 128 is formed when Blades 126c and 126d move to the longitudinal direction of drawing. In addition, this drawing (b) and (c) show drawing when seeing the condition of this drawing (a) from right and left and the upper and lower sides, respectively.
[0023] Drawing 4 shows the greatest opening 128 formed when Blades 126a-126d are driven similarly.
[0024] Drawing 5 shows the perspective view of the adjustable aperture diaphragm

section 11 shown in drawing 2 , and constitutes it from an outer case 120 as a stator which formed the motor 12 in the outermost part of housing 2, a rotator 121 prepared inside the outer case 120, and a rotation ring 122 which is prepared inside this rotator 121 and rotates with a rotator 121 by the key 1210 in this example.
[0025] Moreover, the rotation ring 122 and a slider 123 move up and down, while the rotation ring 122 also rotates and a slider 123 rotates by this, when screw engagement is carried out by crest 123a and trough 123b of a screw, therefore a rotator 121 rotates.
[0026] Furthermore, as shown also in this drawing, the slot (slot) 13 is cut by housing 2, and the presser-foot pin 124 prepared in the slider 123 along with this slot 13 moves. When this slider 123 advances side by side above the drawing as mentioned above for example, it is moved with the rotation ring 122, but when the rotation ring 122 rotates in the direction contrary to illustration, with a spring 129, is depressed caudad and goes.
[0027] And when a slider 123 presses down with the rotation ring 122 and a pin 124 is moved, in order to make it not move more than the maximum location, the top presser foot 130 is formed.
[0028] Drawing 6 shows the flat-surface sectional view of the adjustable aperture-diaphragm section 11 when line X-X cuts in drawing 5 , and as shown in this drawing, in order that a slider 123 may be inserted in a slot 13, the presser-foot pin 124 may be pressed down from this condition of having inserted in and a pin 124 may push a blade 126, the spring 131 is formed in the interior.
[0029] Thus, it follows on a slider 123 sliding a slot 13, and presses down, and a pin 124 opens a blade 126, or closes, and is controlling the area of opening 128.
[0030] Drawing 7 is the same as the lens 1 which is what showed the example of the control section 20 for controlling the adjustable aperture-diaphragm section 11 shown above, and was shown by the dotted line, the adjustable aperture-diaphragm section 11, and the thing indicated to be a detector element 3 above.
[0031] And if the infrared light by which incidence was carried out through a lens 1 and the adjustable aperture-diaphragm section 11 in the detector element 3 is changed into an analog signal and it gives the signal-processing section 21, he is trying to display the infrared image of a target body with a drop (not shown) in this signal-processing section 21 by changing an input analog signal into a digital image signal, and sending to a display and the image-processing section 22.
[0032] Moreover, the digital image signal of the signal-processing section 21 is sent also to a detecting element 23, and detects the value of p-p (peak-peak) in the signal for every frame of a digital image here. the peak-to-peak value detected by the detecting element 23 is graduated in the data-smoothing section 24 -- having -- the maximum of the picture signal for every frame -- outputting -- this maximum and reference value -- difference -- comparing in operation part 25 -- both difference -- a value is acquired.
[0033] difference -- the difference obtained by operation part 25 -- a value will be given to the adjustable aperture-diaphragm section 11 by carrying out power amplification with power amplification 27, after being changed into an analog signal with D/A converter 26.
[0034] Therefore, the movement magnitude of the rotation ring 122 of the motor 121 of the adjustable aperture-diaphragm section 11 is determined by how many [a reference value and] the maximums differ, and the level of the infrared light as which current was detected is controlled so that the presser-foot pin 124 makes a blade 126 a predetermined opening area through a slider 123 in connection with this.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline block diagram of the infrared image equipment concerning this invention.
[Drawing 2] It is the outline block diagram of the adjustable aperture-diaphragm section used for the infrared image equipment concerning this invention.
[Drawing 3] It is drawing showing the condition that the minimum opening was obtained according to the control state of the blade used for this invention.
[Drawing 4] It is drawing showing the condition that the greatest opening was obtained according to the control state of the blade used for this invention.
[Drawing 5] It is the perspective view showing the example of the adjustable aperture-diaphragm section used for this invention.
[Drawing 6] It is the flat-surface sectional view of the adjustable aperture-diaphragm section cut by line X-X in drawing 5 .
[Drawing 7] It is the block diagram having shown the configuration of the example of the control section used for the infrared image equipment concerning this invention.
[Drawing 8] It is drawing having shown the conventional technique (JP,1-155220,A).
[Description of Notations]
1 Lens
2 Housing
3 Detector Element
5 Cold Shielding
6 Detector
7 Window
9 Light Reflex Layer
10 Light Absorption Layer
11 Adjustable Aperture-Diaphragm Section
12 Motor
13 Slot
20 Control Section
123 Slider
124 Presser-Foot Pin

125 Spring
126 Blade
128 Opening
The same sign shows the same or a considerable part among drawing.

[Translation done.]